

division of the subject matter embraced therein. And then for the next thirty pages, if, instead of merely 5831, there were added the name of the group, as Aves: Casuarii; Aves: Anseres; Aves: Passeres, etc., it would certainly save the average user much vexation of spirit. To further facilitate use there should also be a separate index for each 'branch' under 'Special Zoölogy,'—one for birds, another for mammals, and so on through the 29 sections, giving page references to each of the subdivisions of the subject matter. The indexes should be placed at the end of the sections, so that in this way each section would begin on an odd page instead of in the middle of a column, as now, without any marked break to catch the eye.—J. A. A.

Cooke's 'Some New Facts about the Migration of Birds.'¹—Professor Cooke's 'new facts' are presented under the following subheadings (1) 'Introduction'; (2) 'Causes of Migration'; (3) 'How do Birds find their Way?'; (4) 'Casualties during Migration'; (5) 'Distance of Migration'; (6) 'Routes of Migration'; (7) 'Are Birds Exhausted by a Long Flight?'; (8) 'Relative Position during Migration'; (9) 'Relation of Migration and Temperature'; (10) 'Variation in the Speed of Migration'; (11) 'The Unknown.' The 'Introduction' states briefly the present resources of the Biological Survey for investigations of the migration of North American birds, after nearly twenty years spent in the accumulation of data. As to causes of migration, the author states: "The broad statement can be made that the beginnings of migration ages ago were intimately connected with periodic changes in the food supply, but this motive is at present so intermingled with others unknown, or but imperfectly known, that migration movements seem now to bear little relation to the abundance or absence of food."

Under 'How do Birds find their way?' he admits that "among day migrants sight is probably the principal guide," and that it "undoubtedly plays a part in guiding the night journeys also"; but he believes they also possess a power, whatever its nature, that "may be called a sense of direction," which serves to guide them unerringly over ocean wastes. He further says: "A favorite belief of many American ornithologists is that coast lines, mountain chains, and especially the courses of the larger rivers and their tributaries, form well-marked highways along which birds return to previous nesting sites." That many birds reared in Indiana, Illinois, and elsewhere to the northwestward visit South Carolina and Georgia in their fall migration has, however, long been known. "The truth seems to be," he affirms, "that birds pay little attention to

¹ Some New Facts about the Migration of Birds. By Wells M. Cooke, Assistant Biological Survey. Yearbook U. S. Depart. Agriculture for 1903, pp. 371-386.

natural physical highways, except when large bodies of water force them to deviate from the desired course." It does not follow, however, that because all the birds of a district do not concentrate and move in masses along river valleys and coast lines that they are not guided in their courses by the prominent features of the landscape, even in the case of those species which pass from the upper Mississippi Valley to the coast of South Carolina and Georgia. Nor is it true that river valleys, etc., do not form favorite migration routes for many species of birds. So far as our acquaintance with the literature of the subject goes, it is not the "favorite belief," etc., that the prominent physical features of the continent "form well-marked highways" along which migratory birds travel, but merely constitute the landmarks by which their journeys are guided.

Under 'Routes of Migration' much new information is presented, the direct outcome of the author's investigations. He specifies several routes by which North American birds reach northern South America. The first is by Florida, the Bahamas, and the Greater and Lesser Antilles. Of 50 New England species that pursue this route the greater part do not pass beyond Porto Rico. "Only adventurers out of some 6 species gain the South American mainland by completing the island chain." A more direct route is by Florida, Cuba, and Jamaica, taken by about 60 species, of which about half stop in Cuba, the rest passing on to Jamaica, while only about 10 of these leave Jamaica to cross the 500-mile stretch of open water to reach South America. Of these the Bobolink is so conspicuous by its numbers, in comparison with its fellow travellers. "that the passage across the Caribbean Sea from Cuba to South America may with propriety be called 'bobolink route.'"

The main highway to South America is from northwestern Florida across the Gulf of Mexico over a sea course of 700 miles. The Cuba-Yucatan route, formerly supposed to be a favorite one, involving only a 100-mile sea flight, Mr. Cooke affirms is taken by only "a few swallows, some shore birds, and an occasional land bird storm-driven from its intended course, while over the Gulf route, night after night, for nearly eight months in the year, myriads of hardy migrants wing their way through the darkness toward an unseen destination." Still further west, the birds of the Plains and Rocky Mountains which choose Mexico and Central America for their winter home reach these countries by a leisurely land journey. It would be interesting to know to what extent some of these generalizations rest on negative evidence, for stations along the eastern coast of Mexico, including Yucatan, where observations have been made bearing on the migration of birds are certainly few and far between, and cover only short periods.

An interesting feature of the paper is the account of the migration routes of the Golden Plover, illustrated by a map showing the breeding area of the species and its two very distinct routes of migration—a direct sea course in the autumn, from Nova Scotia to Venezuela, and the interior

spring route, which crosses North America almost centrally from the coast of Texas to the Arctic Barren Grounds.

Most important of the 'new facts' are the statistics given under 'migration and temperature,' and under 'variations in the speed of migration' over different portions of the continent, in accordance with the change in the direction of the isotherms. The explanation given of the increase in the distance of daily travel after passing the northern boundary of the United States of such birds as visit Alaska and that portion of the Dominion of Canada west of the Makenzie Valley, is eminently reasonable and satisfactory. The subject is clearly illustrated by means of a map showing the 'Speed of the Robin in Migration,' which indicates not only the acceleration of the progress of the Robin as it advances northward, but also the position of the isotherm of 35° at monthly periods from January 15 to June 15.

Finally, 'The Unknown'! Among the chief mysteries that await solution are the winter haunts of the Chimney Swifts, which disappear from our ken the moment they leave the northern coast of the Gulf of Mexico in the fall until they reappear there the last week in March; another equally deep mystery is the winter whereabouts of the Bank Swallow. The route of the Cliff Swallow from Brazil to California, and how the Red-eyed Vireo reaches southern British Columbia at the same time it reaches Nebraska, and before they have appeared in any of the intervening country, are among the problems, says Mr. Cooke, "that continually vex and fascinate the investigator." It is certainly encouraging to see the "mystery of mysteries" of the old Gätkean and allied points of view dwindling to such small proportions in the eyes of modern investigators who trust to facts rather than to figments of the imagination in their attempts to elucidate the problems of migration. — J. A. A.

G. M. Allen's 'The Birds of New Hampshire.'¹—In this excellent paper of 200 pages, an attempt has been made, says the author, "to bring together a list of the species of birds known to have occurred within the State of New Hampshire during historic times, together with a general account of their distribution, faunal position, times of migration, and, in the case of the rarer species, a detailed list of the known instances of occurrence." While published records have been utilized, "a considerable body of unpublished facts relative to the birds of the State is here included," partly based on the author's own observations and partly on those of other ornithologists who have made generous contributions from their notes, and for which due acknowledgments are made. "The sequence of names and their spelling," the author states, "are strictly

¹ The Birds of New Hampshire. By Glover Morrill Allen. Proc. Manchester Institute of Arts and Sciences, Vol. IV, Pt. I, 1902 (1903), pp. 23-222. Published about June 15, 1904.